

**Technical Review and Evaluation of the Application for Air Quality
Significant Permit Revision #46747 to Operating Permit #38109**

I. INTRODUCTION

This significant permit revision for Freeport - McMoRan Safford Inc., the Permittee, authorizes the company to install and operate a 1,350 ton per day sulfuric acid plant. New equipment includes the acid plant, a 5.23 MMbtu/hr propane start up boiler, a 68.4 MMbtu/hr propane pre heater, and a 28,500 gallon per minute cooling tower. These changes are to be undertaken at the Freeport - McMoRan Safford Mine located at 8500 North Freeport – McMoRan Road in Safford, Gila County, Arizona.

In addition, the Arizona Department of Environmental Quality (ADEQ) has determined that the New Source Performance Standards for Metallic Mineral Processing Plants (NSPS Subpart LL) apply to some of the equipment at the facility and the permit is being revised to reflect this determination.

The addition of the acid plant meets the requirements of A.A.C. R18-2-320.B and as such necessitates this significant permit revision.

II. FACILITY DESCRIPTION

A. Process Description

The process starts with the burning of elemental sulfur to form sulfur dioxide gas. The gas reacts with oxygen on a catalyst to form sulfur trioxide gas. The sulfur trioxide is combined with water to form sulfuric acid. Heat released by the burning of the sulfur and the exothermic reactions is reused where possible but is ultimately removed by the cooling tower. The propane pre heater and start up boiler are used to bring the cold acid plant up to operating temperature whenever it has been shut down for an extended period.

B. Air Pollution Control Equipment

A caustic scrubber is used to lower the concentration of SO₂ in the exhaust gas of the acid plant from approximately 350 parts per million (ppm) to 20 ppm. The scrubber achieves this by contacting the exhaust gas with a sodium hydroxide solution. A continuous emission monitoring system (CEMS) will be utilized to monitor the concentration of SO₂ released to the atmosphere.

III. EMISSIONS

The new equipment will result in an increase in the potential emissions (PTE) of carbon monoxide (CO), particulate matter with a diameter less than 10 microns (PM₁₀), particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO₂), volatile organic compounds (VOCs) and sulfuric acid mist (H₂SO₄).

The potential emissions from the acid plant and the new PTE of the entire facility are summarized in Table 1.

Table 1: Net Potential Emissions Resulting from Significant Revision and new PTE of Entire Facility

| Pollutant | PTE of Revision (tpy) | PTE of Entire Facility Prior to Revision (tpy) | New PTE of Entire Facility (tpy) |
|--------------------------------|-----------------------|--|----------------------------------|
| CO | 1.17 | 5.12 | 6.29 |
| NO _x | 44.6 | 38.4 | 83.0 |
| SO ₂ | 48.5 | .630 | 49.1 |
| VOCs | .024 | 1.40 | 1.42 |
| PM | 4.67 | 64.0 | 68.7 |
| PM ₁₀ | 4.67 | 64.0 | 68.7 |
| H ₂ SO ₄ | 8.98 | 0 | 8.98 |

Notes:

- 1- The PTE of the revision is the sum of the PTE of the acid plant, cooling tower, propane pre-heater and start-up boiler. The PTE is based on continuous operation of the acid plant and cooling tower and 12 cold startups a year for the propane pre-heater and startup boiler.
- 2- The PTE of the acid plant is based on permit limits for NO_x, and SO₂, manufacturer guarantees for H₂SO₄ and CO, and AP-42 Section 13.4 for PM and PM₁₀.
- 3- The PTE of the cooling tower is based on emission factors contained in AP-42 Section 13.4 for PM and PM₁₀.
- 4- The PTE of the propane pre heater and start-up boiler are based on emission factors contained in AP-42 Section 1.5
- 5.. The PTE of the facility prior to the revision is based on the TSD of Permit #38109 and Minor Revision #45819.

IV. APPLICABLE REGULATIONS

The applicable regulations were identified by the agency as part of the application review. If necessary, the source is required to list any additional regulations that may be applicable. Table 2 displays the applicable requirements for each piece of equipment under this proposed significant revision.

Table 2: Verification of Applicable Regulations

| Unit | Control Device | Rule | Verification |
|--|---|--|--|
| Metallic Mineral Processing from Primary Crusher to Leach pad; excluding material handling from the primary crusher and the coarse ore stockpile, the lengths of all conveyor belts between the transfer points, the conveyor to fine ore stockpile drop point and the final conveyor drop point at the leach pad. | Baghouses; Water sprays; Material moisture after the agglomerator | 40 CFR 60.382(a) 40 CFR 60.382(a)(2) 40 CFR 60.382(b) 40 CFR 60.386(a) 40 CFR 60.386(b)(2) | The crushers, screens, conveyor belt transfer points, storage bins and truck unloading stations are affected facilities located in a metallic mineral processing plant as defined in NSPS Subpart LL |

| Unit | Control Device | Rule | Verification |
|---|---|--|--|
| Metallic Mineral Processing from the primary crusher and the coarse ore stockpile, the lengths of all conveyor belts between the transfer points, the conveyor to fine ore stockpile drop point and the final conveyor drop point at the leach pad. | Baghouses; Water sprays; Material moisture after the agglomerator | A.A.C. R18-2-702.B.3 A.A.C. R18-2-702.C A.A.C. R18-2-721.B.1 A.A.C. R18-2-721.B.2 A.A.C. R18-2-721.D | The PM limits from A.A.C. R18-2-721 apply to material handling conducted at an existing nonferrous metals industry source. The opacity standards from A.A.C R18-2-702 apply to existing stationary point sources. |
| Sulfuric Acid Plant | Caustic Scrubber | 40 CFR 60.8(a) 40 CFR 60.85(b)(2) 40 CFR 60.11(c) 40 CFR 60.11(e)(1) 40 CFR 60.13(a) 40 CFR 60.13(b) 40 CFR 60.13(c)(2) 40 CFR 60.13(e) 40 CFR 60.13(h) 40 CFR 60.82(a) 40 CFR 60.83(a)(1) 40 CFR 60.83(a)(2) 40 CFR 60.84(a) 40 CFR 60.84(b) 40 CFR 60.84(c) 40 CFR 60.84(d) 40 CFR 60.84(e) 40 CFR 60.85(b) 40 CFR 60.85(b)(1) 40 CFR 60.85(b)(2) 40 CFR 60.85(b)(3) 40 CFR 60.85(b)(4) 40 CFR 60.85(c) 40 CFR 60.85(c)(1)(i-iii) | NSPS Subpart H applies to sulfuric acid production units constructed after August 17, 1971. |
| Propane Start-up Boiler | N/A | A.A.C. R18-2-724.C.1 A.A.C. R18-2-724.J | These standards apply to fossil fuel fired industrial equipment rated at between .5 MMBTU/hr and 250 MMBTU/hr in which the products of combustion do not come into direct contact with process materials. |
| Propane Pre Heater and Cooling Tower | N/A | A.A.C. R18-2-702.B A.A.C. R18-2-702.C A.A.C. R18-2-730.A.1.a A.A.C. R18-2-730.A.1.b A.A.C. R18-2-730.A.2 A.A.C. R18-2-730.A.3 A.A.C. R18-2-730.B A.A.C. R18-2-730.E A.A.C. R18-2-730.F | These standards apply to unclassified sources. |

V. Monitoring Requirements

A. Metallic Mineral Processing Subject To NSPS Subpart LL

1. The Permittee is required to show compliance with the opacity standards in Attachment “B”, Section III by having a Method 9 certified observer perform bi-weekly surveys of visible emission from the baghouses (7% opacity standard) and process fugitive emission points (10% opacity standards). The observer is required to conduct a 6 minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard or baseline opacity level.
2. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.
3. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission source and submit the necessary excess emission reports.

B. Metallic Mineral Processing Subject to R18-2-721

1. The Permittee is required to show compliance with the 20% opacity standard in Attachment “B”, Section XIV by having a Method 9 certified observer perform bi-weekly surveys of visible emissions. The observer is required to conduct a 6 minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard.
2. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.
3. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission source and submit the necessary excess emission reports.

C. Propane Start-up Boiler

1. The Permittee is required to show compliance with the 15% opacity standard in Attachment “B”, Section V.D.1 by having a Method 9 certified observer perform an annual survey of visible emissions from the stack of the propane start up boiler. The observer is required to conduct a 6 minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard.
2. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.
3. The Permittee is required to keep records of any corrective action taken to lower

the opacity of any emission source and submit the necessary excess emission reports.

D. Acid Plant

1. The Permittee is required to show compliance with the 4 lbs of SO₂ per ton of acid produced emission standard in Attachment “B”, Section XIII.B.1.a and the 11.05 lb SO₂/hr emission standard in Attachment “B”, Section XIII.B.1.b by installing, maintain, certifying and operating a SO₂ CEMS and a flow measurement sensor.
2. The Permittee is required to comply with 40 CFR Part 60 Appendix F, “Procedure 1” for quarterly Cylinder Gas Audits (CGA), quarterly Relative Accuracy Audits (RAA) and annual Relative Accuracy Test Audits (RATA).
3. The Permittee is required to report as excess emissions all three-hour periods (or the arithmetic average of three consecutive one-hour periods) during which the integrated average SO₂ emissions exceed the 4 lbs of SO₂ per ton of acid produced emission standard in Attachment “B”, Section XIII.B.1.a.
4. The Permittee is required to show compliance with the 10% opacity standard in Attachment “B”, Section V.D.1 by having a Method 9 certified observer perform a bi-weekly survey of visible emissions from the acid plant. The observer is required to conduct a 6 minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard or the baseline opacity level.
5. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.
6. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission source and submit the necessary excess emission reports.

E. Unclassified Sources

1. The Permittee is required to show compliance with the 20% opacity standard in Attachment “B”, Section XV.D by having a Method 9 certified observer perform a quarterly survey of visible emissions from the cooling tower and a monthly survey of visible emissions propane pre heater. The observer is required to conduct a 6 minute Method 9 observation if the results of the initial survey appear on an instantaneous basis to exceed the applicable standard.
2. The Permittee is required to keep records of the name of the observer, the time, date, and location of the observation and the results of all surveys and observations.
3. The Permittee is required to keep records of any corrective action taken to lower the opacity of any emission source and submit the necessary excess emission reports.

VI. TESTING REQUIREMENTS

A. Metallic Mineral Processing Subject To NSPS Subpart LL

There are no changes to the testing requirements for this equipment.

B. Metallic Mineral Processing Not Subject To NSPS Subpart LL

There are no changes to the testing requirements for this equipment.

C. Acid Plant

1. Within 60 days after achieving the maximum production rate at which the facility will be operated, but not later than 180 days after initial startup of the facility, the Permittee is required to demonstrate compliance with the 4 lbs of SO₂ per ton of acid produced emission standard in Attachment “B”, Section XIII.B.1.a and the 11.05lb SO₂/hr emission standard in Attachment “B”, Section XIII.B.1.b by performing an initial Method 8 performance test. The Permittee must conduct a Method 8 performance test annually thereafter.
2. Within 30 days of the initial Method 8 performance test, the Permittee is required to conduct a performance evaluation of the SO₂ CEMS in accordance with 40 CFR 60, Appendix B, "Performance Specification 2". The test must be conducted annually thereafter.
3. Within 30 days of the initial Method 8 performance test, the Permittee is required to conduct a performance evaluation of the flow measurement sensor in accordance with 40 CFR 60, Appendix B, "Performance Specification 6". The test must be conducted annually thereafter.
4. Within 60 days after achieving the maximum production rate at which the facility will be operated, but not later than 180 days after initial startup of the facility, the Permittee is required to demonstrate compliance with the .15 lbs of acid per ton of acid produced emission standard in Attachment “B”, Section XIII.C.1 by performing an initial Method 8 performance test. The Permittee must conduct a Method 8 performance test annually thereafter.
5. The Permittee is required to demonstrate compliance with the 10% opacity standard in Attachment “B” Section XIII.D.1.a by performing an initial Method 9 performance test concurrently with the initial SO₂ performance test. The Permittee must conduct a Method 9 performance test annually thereafter.
6. Within 60 days after achieving the maximum production rate at which the facility will be operated, but not later than 180 days after initial startup of the facility, the Permittee is required to demonstrate compliance with the 10.0 lb/hr NO_x standard in Attachment “B” Section XIII.E.1. by performing an initial Method 7 performance test. The Permittee must conduct a Method 7 performance test annually thereafter.

VII. IMPACTS TO AMBIENT AIR QUALITY

The expected impacts to ambient air quality from the acid plant and of the entire facility are summarized

in Table 3.

Table 3: Expected impacts to ambient air quality resulting from the Acid Plant and the entire facility

| Pollutant (Averaging Time) | NAAQS ($\mu\text{g}/\text{m}^3$) | Maximum Predicted Concentration From Acid Plant ($\mu\text{g}/\text{m}^3$) | Maximum Predicted Concentration from Entire Facility Including Background Concentrations ($\mu\text{g}/\text{m}^3$) | Percentage of NAAQS |
|-------------------------------|---------------------------------------|--|---|------------------------|
| PM ₁₀ (24-hour) | 150 | 0.2 | 39.7 | 26.5% |
| PM ₁₀ (annual) | 50 | 0.1 | 14.2 | 28.4% |
| SO ₂ (3-hour) | 1,300 | 10.2 | 373 | 28.7% |
| SO ₂ (24-hour) | 365 | 4.5 | 50.7 | 13.9% |
| SO ₂ (annual) | 80 | 0.9 | 4.8 | 6.0% |
| NO _x (annual) | 100 | 0.8 | 17.9 | 17.9% |

VIII. LIST OF ABBREVIATIONS

| | |
|--------------------------------|---|
| AAC: | Arizona Administrative Code |
| ADEQ | Arizona Department of Environmental Quality |
| CEMS | Continuous Emissions Monitoring System |
| CFR | Code of Federal Regulations |
| CGA | Cylinder Gas Audit |
| CO | Carbon Monoxide |
| H ₂ SO ₄ | Sulfuric Acid |
| MMBtu/hr | Million British Thermal Units per Hour |
| NAAQS: | National Ambient Air Quality Standards |
| NO _x | Nitrogen Oxides |
| NSPS: | New Source Performance Standards |
| PM | Particulate Matter |
| PM ₁₀ | Particulate Matter with an Aerodynamic Diameter of less than 10 microns |
| PTE: | Potential to Emit |
| RAA | Relative Accuracy Audits |
| RATA | Relative Accuracy Test Audits |
| SO ₂ | Sulfur Dioxide |
| VOC: | Volatile Organic Compounds |